



" Raw Influent Treatment Processes Eliminating
Secondary Biological Treatment "

Title of Invention is: "Toxics, Organics, Color Removal Technology Process /or Method For
Toxics, Organics, Color Reduction of All Pulp/Paper Mills' Wastewaters"

Name of Inventor: "Colonel" Launeil Sanders

Citizenship of Inventor: Natural U.S. Born Citizen

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Assignee: NONE

Attorney/Agent/Other: NONE

Application No.:

Original Application Signed & Notarized On: April 6, 1999

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(2)

This is new technology and is not in public domain. Immediately, upon release of this into public domain all of the approximately 650 to 950 integrated pulp and paper mills in the United States of America, those in Canada, and the rest of the World will want to install this "New Technology Process /or Method" in their mills to save 80% to 95% electrical energy costs in their wastewater treatment aeration systems. This electrical cost is enormous as, for example, an integrated mill with 4400 HP of aeration that could save 95% electrical energy would save over \$2,000,000 per year after installing this said New Technology Process /or Method.

That along with the chief economic advantage discussed above this New Technology Process /or Method reveals that there is no biological activity in the aeration, activated sludge, and other biological systems; and furthermore that this "hypocritical myth" has been portrayed, perpetrated, and played out by United States Environmental Protection Agency Administrator and subsequently by the 50 states overseeing regulatory agencies. { that EPA and States have only required BOD in NPDES permits and not COD, TOC, and COLOR } This myth that present effluent guidelines and limits with biological oxygen demand, 5 day test, (BOD), with its insensitive, inaccurate, and insufficient capabilities are adequate to protect aquatic life and human health are False and Untrue. Thus, in summarizing, as it will be discussed in further detail later shown below is comparison of "Old Biological Technology" versus "New Technology Process /or Method by Inventor Colonel Launeil Sanders":

(1) - patent prosecuting procedure requires to change name to reflect clarity, secrets & compliance

(2) - delete new spec. to patent prosecuting procedure

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Final effluent discharge to Stream

Pollutant Parameter:

Concentrations in Discharge Effluent (in milligrams per liter) [COLOR in mu]

	"Old Biological Technology"	New Technology By Inventor Launeil
Sanders		
BOD5	60-90	40-60
COD	250-400	40-65
TOC	150-300	40-65
COLOR	1000- 4000	100-250

CROSS -REFERENCE TO RELATED APPLICATIONS

"Not Applicable"

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

"Not Applicable"

REFERENCE TO A MICROFICHE APPENDIX

"Not Applicable"

BACKGROUND OF THE INVENTION

(3)

A. GENERAL DISCUSSION

The "Field of Invention" or "Technical Field" pertains to Pulp/Paper Mills Patents for Color Removal . Attached in Appendix A , of this application, are the U.S. Patent Search Summaries via U.S. Patent and Trademark Office in fields of " Lime Treatment" , Alum Treatment" and Color Removal. These said "Old Fields of Invention" in Color Removal for Pulp/Paper Mills are Old in that No Prior Knowledge /Or Art Existed that Revealed That No Biological Activity / That no biodegradation of organic occurred in aeration/activated sludge /other biological systems .That this said New Technology Invention by Inventor Colonel Launeil Sanders is New Technology that is not currently in public domain. All "Old Fields of Invention" are lacking of this said "New Technology Invention by Inventor Colonel Launeil Sanders" in that all end-users are simply wasting 80% to 95% of electrical energy in their energy systems , and are discharging a very inferior quality of wastewater.

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(3) Insert #1

1. Field of Invention

2. Description of Prior Art

New Spec pp 2 - 5

This is Currently The Loop-Hole in the Law and Loop-Hole / Deficiencies in Old Field of Invention; and deficiencies in US EPA Administrator Carol Browner in that all Pulp/Paper mills' NPDES permits have to be re-opened by CWA (Public Law 92-500) and new permits issued.

Because that no biological degradation of toxics and organics occurs in current "Old Fields of Invention" and that the effluent pollutant parameters of chemical oxygen demand (COD), total organic carbon (TOC) , and Color (COLOR) go through the aeration systems unchanged proves industry / end users are pouring their aeration electrical dollars down the toilet ; no aeration is required .{ SEE ATTACHED FIGURES 3 AND 4} The Old Existing Art does not protect aquatic life and human health. The "Said Old Art/Fields" wastes tremendous electrical energy , and ,that if, the end-users/ owners were only aware they could save millions of dollars per year. That's one main purpose of this patenting of this utility patent and invention is to convey to Public Knowledge and Ramify wastewater treatment in pulp/paper mills. This New Technology Process- "Toxics, Organic, Color Removal Technology Process /or Method For Toxicities, Organic, Color Reduction of All Pulp/Paper Mills' Wastewater" solves Old Existing Art/Problems in that zero per cent Color is removed by Old Existing Art. Additionally, zero percent Chemical Oxygen Demand (COD) , and zero percent Total Organic Carbon (TO)^{TOC}, and zero Adsorbable Organic Halogens (AOX) are removed by the Old Existing Art.

There are currently approximately 650 to 950 integrated pulp/paper mills in USA. The U.S. Environmental Protection Agency's Effluent Guidelines Development Document (1978) identified approximately 650 to 750 integrated mills. That Lienal Sanders performed the research and development work individually on his own private time during the period of November 1977 till September 1980. That said inventor individually performed analytical analyses on approximately 280 samples over this three year period. The technical feasibility , the technical development of New Art/ Technology was demonstrated during this period as shown in claims later in this specification it was proven that the New Technology Process /or Method- "Toxics,Organics, Color Removal Technology Process /or Method For Toxicities, Organic, Color Reduction of All Pulp/Paper Mills'

Wastewater" did and could perform the following in deeming "Old Art /Fields" to be obsolete :

1. That all BOD may be removed across *Device(s) A*, clarifiers, settlers and no aeration and no electrical energy is required.
2. Therefore, approximately 80% to 95% electrical energy costs are saved in aeration systems, saving end-users (owners) millions of dollars annually.
3. That this said New Technology by Inventor Colonel Lienal Sanders results in approx 95% removal efficiencies for each respective pollutants of Chemical Oxygen Demand (COD) , Total Organic Carbon (TO) , and COLOR ; and that 95% BOD is removed at clarifier thus showing that 23 days aeration or hours of aeration in activated sludge were not required. No Biological Destruction nor removal of Toxicities, Organic, AIX, nor other harmful pollutants occurs in biological treatment.
4. That this said New Technology- "Toxicities ,Organic, Color Removal Technology Process /or Method For Toxicities, Organic, Color Reduction of All Pulp/Paper Mills' Wastewater" by Inventor Colonel Lienal Sanders also becomes BACT (Best Economically Achievable Technology) for Adsorbable Organic Halogens (AIX) and Dioxins .
5. That this said New Technology by Inventor Colonel Lienal Sanders also reveals the extreme , severe Loop-Holes in current Law by utilizing BOD parameter and how extremely inaccurate this pollutant parameter is and the detriments to environment for continued basis and use of this pollutant parameter.
6. That this said New Technology by Inventor Colonel Lienal Sanders also reveals in a very important second point to item #5 above that there is a "Hypocritical Myth" that organic matter is biodegraded by *Device(s) B*. However, this is Totally False; what is really happening is that in the aeration systems the organic particles, Lignins, and mostly all pulp /paper constituents are somehow simply changed from their anions negative anions charges and no longer result positive to BOD (5 day demand) analytical test. But they are neither biodegraded nor destroyed.

The development of this said New Technology- "Toxicities, Organic, Color Removal

Technology Process /or Method For Toxicities, Organic, Color Reduction of All Pulp/Paper Mills' Wastewater" was developed at DeRidder, Louisiana. That inventor "Colonel" Lienal Sanders was employed from October 1977 to November 1980 at Boise Southern Company , DeRidder , Louisiana, as an Environmental Engineer. As stated inventor "Colonel" (Lienal) Sanders performed this research and development on his own time , and was not hired to develop any patent concerning wastewater. Secondly, that Boise Southern (which at that time was 50% owned by Boise Cascade and 50% owned by Southern Natural Gas) of which, neither have any knowledge and that Boise Cascade does not have operating in any of their plants world-wide this said New Technology- "Toxics,Organics, Color Removal Technology Process /or Method For Toxicities, Organic, Color Reduction of All Pulp/Paper Mills' Wastewater" developed solely by said inventor "Colonel (Lienal) Sanders. Thirdly, that said inventor does acknowledge that Southern Natural Gas and Boise Cascade do possess " Shop Rights" which is legal rights to have all their operating facilities equipped first of this "New Said Technology"; however this does not exempt either from payment of any and all patent royalties and /or fees or compliance with all facets of U.S. Patent and Trademark Office upon any successful granting of U.S. Patent on this application. That said inventor of this said New Technology- "Toxics ,Organic, Color Removal Technology Process /or Method For Toxicities, Organic, Color Reduction of All Pulp/Paper Mills' Wastewater" does affirm that he was not hired as patent engineer, nor was he hired to develop any patent work, color removal processes/ development etc. by Boise Southern Company and as affirmed earlier and in inventor's sworn affidavit inventor Colonel (Lienal) Sanders performed all work on his own private time.

The "information known to me" is that none of the U.S. , Canada , nor anywhere else worldwide are using this New Inventive Technology. { It is not in public domain} That biological treatment is a myth in all pulp/paper mills aeration systems (doesn't matter if aerated stabilization basins, activated sludge, and all other mechanical air or oxygen systems) as no biological degradation, no destruction of organic matter occurs. (see claims 4 & 5) However, as the COD , ^{TOC} (TO) and COLOR concentrations and quality constitute no biodegradation, destruction has occurred.

Chemicals Addition and Chemicals Regenerative System

That the chemicals conveyed in *stream 4* are added from *Device D* and may consist of any and/or combination of the following chemicals aluminum chloride [AlCl_3] as this is commercial grade liquid solution approx 20 -30%; , Commercial Alum which is liquid aluminum sulfate(17 %commercial liquid solution) [$\text{Al}_2(\text{SO}_4)_3$]; Ferric Chloride which is liquid solution [FeCl_3]; and Ferric Sulfate which is liquid solution [$\text{Fe}_2(\text{SO}_4)_3$]; Ferrous Sulfate which is liquid solution [FeSO_4] the chemicals are added at influent at *stream 1* as there is the combined Automatic Control of these chemicals by *Device C*. *This New* further claims that this New contains an Automated Controller System as shown in *Device C* which will and does automatically control the optimum amount of all chemicals while measurement and accounting of chemicals from Regenerative Chemicals System as shown in *Device E*.

That the solids generated are non-hazardous, and that the approx 15-20% of solids are wasted (because of inert inorganic ash content) in the Sludge Conditioning /Wasting *Device F*. And later may be land filled on site in non-hazardous landfill shown in stream 7. (see claim # 10)

In Old Art/Old Fields as in Lime Treatment for Color Removal this was done at several mills but never instituted nor designed and installed for continuous treatment. That I, Colonel Lienen Sanders, did perform lime treatment of Boise's DeRidder effluent also , but disbanded this type for further treatment with specific chemicals as detailed in claims. In U.S. EPA 's 1983 and 1985 guidelines there were originally 200 mu and 300 mu platinum cobalt limits on Color. However, industry convinced EPA that this lime treatment was cost prohibitive and got these limits deleted. However, U.S. EPA has been extremely negligent in not further investigating and allowing industry to discharge lethal damaging concentrations of COD, TO , and COLOR. Of course, industry with all their engineers and scientists took--for--granted the bio treatment for now that they will know that they have been pouring all their energy dollars in toilet and that they really could have saved those dollars, I believe there will be a quick push for industry to contract for this engineering and install technology. For example, at the Boise DeRidder mill there is approximately 1500 HP of aeration in the aerated stabilization basin (*Device B*) , and assuming 80% electrical energy

elimination and an electricity cost of \$0.13 per kilowatt- hour Boise's DeRidder mill can save \$1,020,000 per year on electricity costs. The prior Old Art/Old Fields of Lime Treatment for Color Removal is Old as they were under the premise /fact that biological aeration systems, activated sludge systems were required. However, as you see from New Invention this is not True and Inventor, (Lienal) Sanders, is revealing to Public Domain that our U.S. EPA has flagrantly failed, that the industry's top scientists & engineers have failed and there has to be the simultaneous progression:

That U.S. EPA will Re-Open all NPDES Wastewater permits via their Re-Opener clauses in existing permits and re-issue with COD, ^{TOC} TO, and COLOR effluent limits (If they do not aggressively pursue , upon filing all materials with U.S. Patent and Trademark Office I intend to file 60 days Citizens Notice with Administrator Browner that I intend to SUE)

Simultaneously, that pulp/paper industries will investigate costs to install systems as they can immediately turn off their aerators and save millions of dollars per year.

One of real problems has been that EPA did not sufficiently realize the inadequacies of the BOD test. And as you can see in the first section of this patent application discharge of a wastewater with COD concentration of 250 to 400 milligrams/ liter, (TO) concentration of 150 to 300 milligrams /liter, and COLOR concentration of 1000 to 4000 milligrams/ liter are toxic to navigable waters and harmful to human health and U.S. EPA must correct their failure to perform duty of Clean Water Act passed by Congress. TOC.

This New Inventive Technology exists nowhere in the U.S. fifty states nor Canada , nor other parts of World. This myth that biological treatment systems are working has to be revealed for the Truth is they are not! There is zero biological degradation in these Old Art systems. That inventor, (Lienal) Sanders, will also be filing a Disclosure Document detailing all 3 years of development performed during 1977 to 1980. And since Boise Cascade nor any one else has any system operating legally they are not inventors nor did they ever know about this New Inventive Technology until U.S. Patent had been applied for and International Patent {PCT Patent Application} were applied for by said Inventor, Colonel (Lienal) Sanders.

As shown in supporting data and analyses supplied with this patent application there are

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specific loop-holes in law that are allowing very high COD, ^{TOC}(TO) and COLOR concentrations be discharged to navigable waters. Thus, allowing this U.S. Patent will provide long awaited mechanisms and legal documentation in order that Inventor, (Lienal) Sanders, is deemed original inventor, and immediate means can be immaculate in requiring EPA to at once halt these criminal harmful discharges that are harming aquatic life and human health.

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B. DISCUSSION OF ALL RELEVANT U.S. PATENTS AND OTHER PATENT SEARCH

1. Treating pulp-and-paper mill streams

United States Patent 4,201,666

Newton May 6, 1980

Treating pulp-and-paper mill streams

Abstract

Aqueous pulp-and-paper mill waste streams are treated with a waste stream derived from the nitric acid etching of aluminum foil for electrolytic capacitors. This waste stream consists essentially of aqueous acidic aluminum nitrate, and a polyelectrolyte is added to it to synergistically improve flocculation, settling, and dosage rates.

Inventors: Newton; Joel A. (Greensboro, NC)

Assignee: Sprague Electric Company (North Adams, MA)

Appl. No.: 032052 Filed: April 23, 1979

U.S. Class: 210/47; 210/52; 162/29

Intern'l Class: C02B 001/20; D21F 001/82

Field of Search: 162/4,29,79 210/42 R,47,51-54

----- References Cited [Referenced By]

U.S. Patent Documents

2741051Apr., 1956Reissig41/42. 3627679Dec., 1971Fuller210/52. 3960648Jun., 1976Nakajima et al.210/53. 4008161Feb., 1977Wong et al.210/53. 4136026Jan., 1979Meyer et al.210/47. 4155845May., 1979Ancelle et al.162/29. Foreign Patent Documents51-41696Apr., 1976JP. 52-42649Mar., 1977JP.

Other References

Chemical Abstracts, vol. 85, 1976, p. 428, No. 130152s, Hirota et al., "Aluminum Compounds (as Coagulants)". Chemical Abstracts, vol. 87, 1977, p. 331, No. 58171u, Tanaka, "Treatment of Waste Water from Pulp Plant". Chemical Abstracts, vol. 86, 1977, p. 343, No. 145264z, Berov et al., "Use of Polyelectrolytes Based on Diethylaminoethyl Methacrylate for Purifying Waste Waters ". Primary Examiner: Wyse; Thomas G.

Attorney, Agent or Firm: Connolly and Hutz

2. Process for color removal from paper mill wastewater

United States Patent 5,529,697

Brqasch, et al. June 25, 1996

Abstract

Potassium permanganate is added to paper mill wastewater streams at an elevated temperature to remove color compounds from the effluent streams. The potassium permanganate causes the formation of flocculant particles which are precipitated out of the stream. This precipitate is then treated with acid to cause resolubilization.

Inventors: Braasch; Dwaine A. (Hattiesburg, MS); Ellender; R. D. (Hattiesburg, MS)

Assignee: The University of Southern Mississippi (Hattiesburg, MS)

Appl. No.: 278017

Filed: July 20, 1994

U.S. Class: 210/710; 162/189; 210/721; 210/724; 210/737; 210/758; 210/760; 210/766; 210/917;
210/919; 210/928

Intern'l Class: C02F 001/52

Field of Search: 162/189

210/721, 724, 726, 737, 752, 758, 759, 760, 766, 917, 928, 710, 919

----- References Cited [Referenced By]

U.S. Patent Documents

1768819	Jul., 1930	Bradley et al..	
1768820	Jul., 1930	Bradley et al..	
1768822	Jul., 1930	Bradley et al..	
1795757	Mar., 1931	Bradley et al..	
3483120	Dec. 1969	Hatch	210/721.
3531370	Sep., 1970	Gould	162/33.
3652407	Mar., 1972	Paleos	210/27.
3758405	Sep., 1973	Fremont	210/23.
<u>3945917</u>	Mar., 1976	Foster	210/28.
<u>3998730</u>	Dec., 1976	Plotz et al.	210/28.
<u>4000033</u>	Dec., 1976	Nicolle et al.	162/29.
<u>4049546</u>	Sep., 1977	Rock	210/30.
<u>4069152</u>	Jan., 1978	Specken	210/721.
<u>4196043</u>	Apr., 1980	Singh	162/30.
<u>4874521</u>	Oct., 1989	Newman et al.	210/639.
<u>5032286</u>	Jul., 1991	Newman et al.	210/737.

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<u>5127992</u>	Jul., 1992	Davies et al.	162/29.
<u>5190669</u>	Mar., 1993	Weibel	210/759.
<u>5194163</u>	Mar., 1993	Saugier	210/759.
<u>5326479</u>	Jul., 1994	Sarker et al.	210/928.

Other References

Parthasarathy, V. R., et al, "Decolourization of Pulp and Paper Mill Effluents", Int. Sem. Mgmt. Envir. Problems Pulp Paper Ind. (New Delhi), pp., 139-159, Feb. 24-25, 1982.

Primary Examiner: Hruskoci; Peter A.

Attorney, Agent or Firm: Arnold, White & Durkee

J 70c That this said patent above as in their claim #1 they re-dissolve the precipitate which is fraudulently aligned with Old Art/Old Fields as the Toxicities, Organic are re-dissolved and the COD, TO and COLOR concentrations would remain high and be detrimental to human health and aquatic life. And again, inventors in this said patent are not aware of New Technology Process or Method revealed by inventor Lienal Sanders as follows:

That with the Old Art/ Old Fields of Invention that there is no biological degradation across *Device B and that only the negatively charged particles are changed from negative state somehow unknown with the aeration ,but the toxicities, organic loading is unchanged across the said aeration systems as the COD , TO, ^{TOC} and COLOR constitute that no biodegradation, destruction has occurred comprising:* Whereas said new invention and New Technology Process /or Method- "Toxics ,Organic, Color Removal Technology Process /or Method For Toxicities, Organic, Color Reduction of All Pulp/Paper Mills' Wastewater" fully protects the public, aquatic life, human health and Loop-Holes in current Law have to be

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amended by U.S. EPA Administrator and all 50 states regulatory agencies by revising permits to include pollutant parameters COD, TO, and COLOR. Old Art/Old Fields of Lime & other Color Removals were thought to be cost prohibitive as the premise was cost of chemicals at *Device A* plus the extended biological aeration was required; however this is a myth which is proven & revealed in said new invention and New Technology- "Toxics ,Organic, Color Removal Technology Process /or Method For Toxicities, Organic, Color Reduction of All Pulp/Paper Mills' Wastewater".

See on page 6 of 11 (5th paragraph) of Braasch's patent " While many different processes have been proposed or experimented with, none has yet proven to provide an effective yet practicable solution to the problem of color removal. What he is saying is in a nut shell as follows:

No pulp and paper mill adds any chemicals nor any other process; they all use only biological treatment which is criminally, flagrantly flawed as previously discussed. EPA Administrator Carol Browner and all her engineers, scientists have failed as well as pulp/paper industry engineers, scientists, and EPA must revise NPDES permits for pollutant parameters COD, TO and COLOR or they will be sued by this inventor Lienal Sanders as allowed by Citizens' Suits under Clean Water Act { 60 days notice will be given to EPA Administrator}

Pulp and paper executive management should understand that their scientists, engineers have taken for granted that biological treatment works; however this is false. I do truly and sincerely believe that upper industry management will understand the this said New Technology Process by Inventor Lienal Sanders will save them the tremendous energy aeration dollars they have been wasting, will provide them more wastewater treatment capacity, will allow them to expand with no environmental wastewater limitations, and will allow them BACT in wastewater that is most economic to meet Toxicities, Organic, AIX, Dioxins, and all other parameters. As I was told at Boise, it is too expensive to remove COLOR so just forget it! Well, I got my hands wet, discovered and developed my said New Technology Process.

Insert # 3 PP10-11

BRIEF SUMMARY OF THE INVENTION

Object /Technical Feasibility : That object of this said new invention and New Technology- "Toxics ,Organic, Color Removal Technology Process /or Method For Toxicities, Organic, Color Reduction of All Pulp/Paper Mills' Wastewater" is to provide a BACT wastewater

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treatment technology process that saves the owners millions of dollars annually in electrical energy costs; and is also BACT wastewater treatment technology process for pollutants Chemical Oxygen Demand, Total Organic Carbon, COLOR, Adsorbable Organic Halogen (AIX), and Dioxins. This three years of Research and Development work proved the technical feasibility and economic viability of this said

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New Technology- "Toxics ,Organic, Color Removal Technology Process /or Method For Toxicities, Organic, Color Reduction of All Pulp/Paper Mills' Wastewater" invented by Inventor Colonel (Lienal) Sanders.

Economic and Technical Advantages : That the following primary advantages exist with this New Technology.

1. That all BOD may be removed across Device(s) A, clarifiers, settlers and no electrical energy is required.
2. Therefore, approximately 75% to 90% electrical energy costs are saved in aeration systems, saving end-users (owners) millions of dollars annually.
3. That this said New Technology by Inventor Colonel (Lienal) Sanders results in approx 95% removal efficiencies for pollutants Chemical Oxygen Demand , Total Organic Carbon ,and Color ; .and additionally a True Biological Oxygen Demand(5 day demand test) Removal of 95% across Device A.
4. That this said New Technology- "Toxics ,Organic, Color Removal Technology Process /or Method For Toxicities, Organic, Color Reduction of All Pulp/Paper Mills' Wastewater" by Inventor Colonel (Lienal) Sanders also becomes BACT (Best Economically Achievable Technology) for Adsorbable Organic Halogens (AIX) and Dioxins .
5. That this said New Technology by Inventor Colonel (Lienal) Sanders also reveals Th extreme , severe Loop-Holes in current Law by utilizing BOD (5 day demand test) on pulp and paper mills' wastewater ; as use of this parameter is extremely inaccurate , fraudulently flagrant and is detriment to environment with its continued use.
6. That this said New Technology by Inventor Colonel (Lienal) Sanders also reveals

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in a very important second point to item #5 above that there is a "Hypocritical Myth" that organic matter is biodegraded by *Device(s)* B. However, this is Totally False; what is really happening is that in the aeration systems the organic particles, Lignins are somehow simply changed from their positive charge and no longer result in positive test to BOD (5 day demand test).

Insert #4 BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

List of all Figures are as follows:

Figure 1- "Flow Diagram Toxics ,Organic, Color Removal Technology Process /or Method For Toxicities, Organic, Color Reduction of All Pulp/Paper Mills' Wastewater".(Drawing 1/4)

Figure 2- "Flow Diagram Toxics ,Organic, Color Removal Technology Process /or Method For Toxicities, Organic, Color Reduction of All Pulp/Paper Mills' Wastewater".(Drawing 2/4)

Figure 3- " Effluent Pollutant Quality of **New** Toxics ,Organic, Color Removal Technology Process For All Pulp/Paper Mills' Wastewater VS. Old Art".(Drawing 3/4)

Figure 4- " Effluent Pollutant Quality of **New** Toxics ,Organics , Color Removal Technology Process For All Pulp/Paper Mills' Wastewater VS. Old Art".(Drawing 4/4)

The existing plant equipment is detailed as existing and New equipment detailed as New Devices. The drawings have a mix of both existing and new devices. This mix of existing equipment is from Old Art/Old Fields .

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DETAILED DESCRIPTION OF THE INVENTION

"DESCRIPTION OF THE PREFERRED EMBODIMENT"

Insert #5
pp 12-16, → That this New Technology Process and new invention can be fully understood by referring to all four Drawings , Figures 1 through 4, attached, which illustrates a 'Preferred Embodiment of Present Invention". In 1978 I had a dream to see if I could discover an economical means or method to remove COLOR , ^{TOC} TO, and COD from pulp and paper mills' wastewater. I was told by many that it would cost \$7,000,000 to \$10,000,000 to remove COLOR from the effluents; and that I might as well forget it. However, I ran 280 detailed analytical analyses (as detailed earlier in this application) and did discover new technology and knowledge which was not , and remains not to be in public domain. The patenting of this new invention is vitally important in several ways:

That human health and aquatic life be protected in that EPA Administrator must revise all

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pulp/paper mills NPDES permits to reflect new limits for COD, TOC, and COLOR

That industry (pulp/paper owners/operators) must be made aware that they are wasting millions of dollars for electrical energy in the aeration systems for nothing as Old Art Biological Treatment does not work & will not work on pulp and paper mills' effluents

This new invention is automatically controlled and once granted patent and issued by U.S. Patent and Trademark Office this said inventor will perform priority engineering, drawings, specifications, patent royalty rights to bring commercial units on-line. Some of this may be achieved prior to issue with proper confidentiality, secrecy agreements signed & executed between said inventor and owners/operators.

That pulp and paper mills influents are large as mills vary in water usage and wastewater from 4 million gallons per day (MGD) to 75 MGD. Thus any treatment system must be able to treat all of raw influent and segregation of wastes will never achieve the goal. One reason is all mills vary and all mills have been designed with all process sewers converging at the raw influent to clarifier --see *Stream 1. It would be cost prohibitive to dig up sewers, replacements, revisions etc.*

Investigation of Old Art Lime Treatment and COLOR Removal

That Boise's raw influent averaged approx 26 to 28 MGD of raw influent. The inventor, Lienal Sanders, did investigate usage of Lime Treatment on raw influent ;however there were many inherent disadvantages and lime treatment was abandoned. Ed Spruill in or around 1976-1980 of Stone Container at Hodge , Louisiana, did perform lime treatment and solids were burned in lime kiln. However, Ed Spruill was not aware of the New Invention & New Knowledge / Technology which I am releasing into public domain. Ed Spruill was not aware that biological treatment was not working , and that if chemicals were added at clarifier the aeration could and should have been eliminated:

That with the Old Art/ Old Fields of Invention that there is no biological degradation across *Device B and that only the negatively charged particles are changed from negative state somehow unknown with the aeration ,but the toxicities, organic loading is unchanged across the said aeration systems as the COD , TO, ^{TOC} and COLOR constitute that no biodegradation, destruction has occurred comprising: Whereas said new invention and New Technology Process /or Method fully protects the public, aquatic life, human health and*

Loop-Holes in current Law have to be amended by U.S. EPA Administrator and all 50 states regulatory agencies by revising permits to include pollutant parameters COD, ^{TOC}TO and COLOR.

Old Art/Old Fields of Lime & other Color Removals were thought to be cost prohibitive as the premise was cost of chemicals at *Device A* plus the extended biological aeration was required; however this is a myth which is proven & revealed in said new invention and New Technology.

That with the Old Art/ Old Fields of Invention in that various Color Removals by addition of lime and other coagulants back in 70's , 80's and early 90's are still Old Art/Fields as they were not aware of specific technology claimed in this said invention :

There is no biological degradation across *Device B* ; *there is no biological degradation in Old Art /Biological Aeration Systems which includes aerated stabilization basins, lagoons, activated sludge, or any other devices where mechanical air or oxygen is inserted(Device B)}* ,and that only the negatively charged particles are changed from negative state{ do not react positive to BOD (5 day demand test) }-- Which is Myth and hypocrisy of Old/ Art of Biological treatment) but as the COD , ^{TOC}TO and COLOR are not affected ,and no biodegradation, destruction has occurred ; therefore the Old Color Removals of Lime Treatment and all other Coagulant Color Removals were deficient from Inventor ^(Lienal)Sanders' said new invention and New Technology Process as they were dependent that biological treatment through aeration systems was additionally required.

Description of New Invention detailed in Figures 1 through 4

Figure 1 shows the raw pulp/paper mills influent, and as it passes through the following Old Art /Old Fields of existing devices and mix of New devices associated with this said technology process. The existing devices in Figure 1 consist of :

Device A- Clarifier and/or settler; Device B- Aeration Stabilization Basins, Activted Sludge , and/or other Mechanical Air/Oxygen Systems; and any Solids Dewatering equipment.

The existing devices in Figure 2 consist of :

Device J-Secondary Activated Sludge Clarifier and/or other settler; Device G-- Retention Holding Lake (huge quantities e.g. 1, 500,000,000 gallons).

The **New Devices** shown in Figure 1 associated with this said technology process are as follows:

Device C-- Automatic Controller for Chemicals Delivered /or Added from Device D.
Device D--Chemicals Storage and Feed System
Device E--Regenerative Chemicals System

The **New Devices** shown in Figure 2 associated with this said technology process are as follows:

Device H-- Automatic Continuous On-Line Analyzer for Continuous Effluent Quality.
Device K--Chemicals Storage and Feed System for Secondary Clarifier(if needed for Polishing)
Device L--Conveyance Device for recycling back to Regenerative Chemicals System
Device M -- New Ash Conditioning/ Wasting System

Figures 3 and 4 depict same equipment; however they also compare the true Pollutant Effluent Concentrations and Quality that Distinguishes this New Technology Process from Old Art/ Old Fields of Invention. Device G is in some mills a huge Lake, Reservoir Holding Lake for impoundment during wasteload allocation and 7 Day Q 10 flow periods in streams during spring-summer- early Fall. These huge capital investments are eliminated by new said technology.

Further discussion of **New Devices** (New Equipment) Associated with New Invention
(in Figures 1 and 2):

Device C is the proprietary Automatic Controller developed by inventor Colonel Lienal Sanders. This automatic controller automatically controls and dispenses any and/or combination of the following chemicals (via *stream 5*) aluminum chloride [$AlCl_3$] as this is commercial grade liquid solution approx 20 -30%; , Commercial Alum which is liquid aluminum sulfate(17 %commercial liquid solution) [$Al_2(SO_4)_3$]; Ferric Chloride which is liquid solution [$FeCl_3$]; and Ferric Sulfate which is liquid solution [$Fe_2(SO_4)_3$] at the optimum dosage rates from storage and feed systems ,{ from Device D .} In addition, this automatic controller , Device C, will measure and account for chemicals regenerated from Device E, Chemical Regenerative and Solids Thickening Device.

Note: Because flow rates vary from mill to mill , and because concentrations of the Toxicities, Organic, COLOR vary automatic control of influent dosage is imperative. For the Boise

mill influent dosage ranged from approx 200 milligrams per liter to 375 milligrams per liter of Alum. As stated earlier in steady-state flow and operation, some flocculated solids will be recirculated by clarifier solids pump to *stream 1*; and some approx 35% regenerative chemicals will be recycled via *stream 6*.

{ Note-- That some existing mills have lamella thickening , belt presses for sludge thickening and this existing equipment may be and will be utilized in reducing industry capital cost of New Equipment}. New equipment also includes on-line process analyzer for *stream #1* that will automatically alarm wastewater operators, depicted as Device H .

The absolute key to this innovative invention is as you see in Figure 3 that by adding chemicals at clarifier -Device A the BOD is approx 50 milligrams per liter exiting clarifier at stream 2. Whereas, in Old Art/ Old Fields " the existing Biological treatment" where no chemicals are added at clarifier and after 23 days in Boise's Aerated Stabilization basin the BOD at stream # 3 is approx 60 - 75 milligrams per liter. And as you see in Old Art/ Old Fields " the existing Biological treatment" the concentrations of COD, (TO), and COLOR go through system unchanged and are criminally negligent, criminally detrimental to human health. We cannot blame the Chief Executives of pulp and paper companies management ; however some blame and responsibilities have to be shared by EPA Administrator and all engineers, scientists responsible for the effluent limits in pulp and paper companies NPDES permits.

" Thus, in 1978 , the questions of:

1. Is there any biological degradation, destruction, toxicities, organic removal by existing Old Art/ Old Fields " the existing Biological treatment"? The ANSWER IS NO!
2. Are all 650 -900 integrated pulp and paper mills in U.S. wasting millions of aeration electrical energy dollars , pouring it down the toilet and still ending up and discharging an inferior toxic wastewater to our navigable waters? This was seemingly , excitedly, very important as if this were true , I could develop the New Technology , New Invention, that would ramify the pulp/paper mills wastewater industry. The ANSWER IS YES!
3. Can the pulp and paper operators stop using aeration in basins, activated sludge(eliminate the electrical energy completely and save millions of dollars) ; as there no biological degradation,

destruction, toxicities, organic removal by existing Old Art/ Old Fields " the existing Biological treatment"? The ANSWER IS YES!

4. If the pulp and paper operators can stop using aeration in basins, activated sludge/ eliminate the electrical energy completely and save millions of dollars) , and there are no biological degradation, destruction, toxicities, organic removal by existing Old Art/ Old Fields " the existing Biological treatment", can the mills economically institute inventor, Lienal Sanders', New Technology Process or/Method ? The ANSWER IS YES!

Having answered all of the above questions and completely addressing these as I went thru the 280 analytical statistical analyses over 2 1/2 years -- the New Invention has been technically and Economically Proven!

delete

CLAIMS

What I, Laurel NEIL Sanders, Inventor, claim as my Invention is:

CLAIM 1- That with chemical coagulation, chemical flocculation, solids agglomeration and flocculation, and chemical precipitation and solids removal the inventor claims enhanced BOD, COD, ^{TOC}TO, and COLOR removals across *Device A*; and further claims 75% to 95% electrical energy savings across *Device B at stream 3* as no aeration is necessary resulting in millions of dollars of savings to owners.

CLAIM 2- That with chemical coagulation, chemical flocculation, solids agglomeration and flocculation, and chemical precipitation and solids removal the inventor claims 95% reduction and removal efficiencies for all said four pollutants Biological Oxygen Demand, Chemical Oxygen Demand, Total Organic Carbon, and COLOR across *Device A at stream 2*.

CLAIM 3- That with the Old Art/ Old Fields of Invention the following pollutant parameters COD, ^{TOC}TO, and COLOR go through the Old Biological Systems Unchanged; therefore there is Zero per cent reduction/ removals for these said three pollutants across all devices in Old Art/ Old Fields of Invention prior to discharge to stream whereas said new invention and New Technology- "Toxics, Organic, Color Removal Technology Process /or Method For Toxicities, Organic, Color Reduction of All Pulp/Paper Mills' Wastewater" removes 95% for each of said four pollutants across *Device A at stream 2* alone.

CLAIM 4- That with the Old Art/ Old Fields of Invention Old Art /Biological Aeration Systems which includes aerated stabilization basins, lagoons, activated sludge, or any other devices where mechanical air or oxygen is inserted(*Device B*) that there is no biological degradation across *Device B and that only the negatively charged particles are changed from negative anions state somehow unknown with the aeration, but the toxicities, organic loading is unchanged across the said aeration systems as the COD, TO, and COLOR constitute that no biodegradation, destruction has occurred comprising: Whereas* said new invention and New Technology Process /or Method fully protects the

public, aquatic life, human health and Loop-Holes in current Law have to be amended by U.S. EPA Administrator and all 50 states regulatory agencies by revising permits to include pollutant parameters COD, ^{TOC}TO, and COLOR ; Old Art/Old Fields of Lime & other Color Removals were thought to be cost prohibitive as the premise was cost of chemicals at *Device A* plus the extended biological aeration was required; however this is a myth which is proven & revealed in said new invention and New Technology.

At stream #3, exiting Device B,

Pollutant Parameter:

Concentrations in Discharge Effluent (in milligrams per liter) [COLOR in mu]

"Old Biological Technology" New Technology By Inventor Lienal Sanders {Note 1}

BOD5	60-90	40-60
COD	250-400	40-65
^{TOC} TO	150-300	40-65
COLOR	1000- 4000	100-250

Note1- With New Technology, the above concentrations for COD, ^{TOC}TO, and COLOR also are same exiting Device A as proves no aeration is required. BOD, COD, ^{TOC}TO concentrations are in milligrams per liter , and COLOR is in Platinum-Cobalt units of mu.

CLAIM 5- That with the Old Art/ Old Fields of Invention in that various Color Removals by addition of lime and other coagulants back in 70's , 80's and early 90's are still Old Art/Fields in that these Old Color Removals of Lime Treatment and all other Coagulant Color Removals were deficient from Inventor Lienal Sanders' said new invention and New Technology Process as they were and still are deficient as they assumed biological treatment through aeration systems was additionally required.

CLAIM 6-That said new invention and New Technology- "Toxics ,Organic, Color Removal Technology Process /or Method For Toxicities, Organic, Color Reduction of All Pulp/Paper Mills' Wastewater" contains a Regenerative Chemicals System as shown in *Device E* whereas approx 35% regeneration is achieved and recycled via stream 6 to the inlet of stream 1 which is inlet to *Device A*.

CLAIM 7- That the chemicals conveyed in *stream 6* are added automatically from *Device D* and may consist of any and/or combination of the following chemicals aluminum chloride [$\text{Al}(\text{OH})_3$] as this is commercial grade liquid solution approx 20 - 30%; , Commercial Alum which is liquid aluminum sulfate(17 %commercial liquid solution) [$\text{Al}_2(\text{SO}_4)_3$]; Ferric Chloride which is liquid solution [FeCl_3]; and Ferric Sulfate which is liquid solution [$\text{Fe}_2(\text{SO}_4)_3$]; Ferrous Sulfate which is liquid solution [FeSO_4] comprising that the chemicals are added at influent at *stream 1* of said new invention and New Technology.

CLAIM 8- That with chemical coagulation, chemical flocculation, solids agglomeration and flocculation, and chemical precipitation and solids removal the inventor claims that this said New Technology Process/or Method becomes BACT (Best Economically Achievable Technology) for Adsorbable Organic Halogens (AOX) and Dioxins.

CLAIM 9- That with chemical coagulation, chemical flocculation, solids agglomeration and flocculation, and chemical precipitation and solids removal the inventor claims an Automated Controller System as shown in *Device C* which will and does automatically control the optimum amount of all chemicals while measurement and accounting of chemicals from Regenerative Chemicals System as shown in *Device E*.

CLAIM 10 - That with chemical coagulation, chemical flocculation, solids agglomeration and flocculation, and chemical precipitation and solids removal the inventor claims that the solids generated are non-hazardous, and that the approx 15-25% of solids are wasted (because of inert inorganic ash content) in the Sludge Conditioning /Wasting *Device M* as non-hazardous wastes shown in stream 15.

CLAIM 11- That with the Old Art/ Old Fields of Invention there were requirements for large Holding Ponds(lakes) *Device G* because of low flow, 7 Day Q 10 's , in the receiving streams ; *whereas* said new invention and New Technology Process fully eliminates any need nor requirement to construct 1,500,000,000 holding lakes /or larger as what occurred at the Boise Southern , DeRidder, Louisiana mill or Bowater's Catawba, S.C. mill and fully saves future mills from these huge capital investments and increases treatment plant capacity.

CLAIM 12- That with chemical coagulation, chemical flocculation, solids

agglomeration and flocculation , and chemical precipitation and solids removal the inventor claims automatic process analyzer *Device H* at the influent *stream 1* which will have alarm and will automatically alert operators of specific spills that require immediate corrective actions.

CLAIM 13-That said new invention and New Technology Process /or Method contains and **comprises the treatment of all pulp and paper mills' raw influent wastewater** as due to fact mills raw influent may range from 3 million gallons per day (MGD) to 70 MGD and mills capital investment sewer systems route all wastes to primary clarifier [as shown in *Device A, stream 1*] in *Figure 1* this is **only cost effective way; no segregation is required** and this was developed on pulping wastes, groundwood pulping, thermomechanical pulping, bleach plant wastes consisting of chlorine, hypochlorite, caustic extraction, lime kiln , recovery boilers, power boilers , utilities, paper machines as this integrated mill produced 1150 TPD (tons per day) of kraft linerboard and 1070 TPD of newsprint (2 machines) with each newsprint machine rated at 535 TPD of newsprint.

CLAIM 14- That said precipitated solids have to be removed from system (some Old Art/Old Fields re-dissolve precipitates at very low pH's with acids; however this is detrimental and a difference of New Invention) whereas underflow precipitated solids from clarifier *Device A* flow via stream 4 to the Regenerative Chemicals System as shown in *Device E* whereas existing dewatering equipment and said Device E are utilized to remove solids, but some flocculated coagulants are recycled via stream 6 to the inlet of stream 1 which is inlet to *Device A*.

ABSTRACT OF THE DISCLOSURE

Approximately 80% to 95% electrical energy costs are saved in aeration systems, saving end-users (pulp and paper mill owners) millions annually. That this said New Technology Process by Inventor Colonel Launeil Sanders results in approx 90 to 95% removal efficiencies for each respective pollutants of Biological Oxygen Demand (BOD , 5 day test), Chemical Oxygen Demand (COD) , Total Organic Carbon (TOC) , and COLOR across the clarifier. That this said New Technology Process will become BACT (Best Economically Achievable Technology) for Adsorbable Organic Halogens (AOX) and Dioxins also.

This New Technology Process reveals the extreme , severe Loop-Holes in current Law by utilizing BOD parameter alone and how extremely inaccurate , negligent, this said BOD pollutant parameter is and the detriments to environment for continued basis and use of this said pollutant parameter alone for pulp/paper mills' wastewater. For presently U.S. EPA and all 50 states as measurement of effluent quality only utilize BOD pollutant parameter, which is fraudulently flagrant and does not protect the environment. There is a "Hypocritical Myth" that organic matter is biodegraded in pulp and paper mills' aeration basins, activated sludge, oxygen and mechanical air ; however, this is Totally False. But when you have mills discharging a wastewater with 250 to 400 milligrams per liter of Chemical Oxygen Demand and 1000 to 4000 milligrams per liter of COLOR, one can easily see detriments to human health and aquatic environment. Matter are neither biodegraded nor destroyed and must be physically/chemically removed from the effluent prior to discharge.

That this New Technology Process or/ Method can be demonstrated to pulp and paper mills' owners/operators and to EPA Administrator that this said New Invention is technically and economically feasible. { via laboratory scale tests without spending any capital investments} That institution of this New Invention increases plant wastewater treatment capacity, and enables pulp and paper mills' owners/operators to increase production capacities { bleach plants, newsprint machines, TMP, and /or other multi-million dollars production expansions} without being wastewater limited and with being more easy to obtain NPDES permits/ revisions from EPA and States, while providing highest quality effluent to our navigable waters. That since pulp and paper mill operations results in configuring a negative electrical charge on the lignins, and other organic ringed compounds , it is these electrical charges that are measured by the Biological Oxygen Demand test. No biological degradation takes place. That since pulp and paper mill operations results in configuring a negative electrical charge on the lignins, and other organic ringed compounds , it is these electrical charges that are measured by the Biological Oxygen Demand test. No biological degradation takes place.

Abstract Re-Written to comply 250 words & patent prosecuting procedures